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AGRICULTURAL CHEMICAL RESEARCH DIVISION
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A List of
PUBLICATIONS ISSUED IN 1944

Mimeographed and Journal Articles and Addresses (with Abstracts),
and Patents

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NOTE: A limited number of reprints of some of the journal articles are available. Those not available are marked with an asterisk (*), but may be consulted in technical libraries such as those located at State Agricultural Experiment Stations, Educational Institutions, and some public libraries.

Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
United States Department of Agriculture

CITRUS

1. MOORE, E. L., Wiederhold, E., Atkins, C. D. and MacDowell, L. G.

ASCORBIC ACID RETENTION IN FLORIDA GRAPEFRUIT JUICES. I. During Commercial Canning. Canner 98, 24-26 (1944).

The average retention of ascorbic acid during commercial canning of unsweetened grapefruit juice in twelve Florida plants was 97%. Analyses were made at the plants after each of four processing steps on the product. Total acidity was determined and shows that sampling was uniform. As loss of ascorbic acid during processing is negligible, no determinations of dehydro ascorbic acid were made.

2. ATKINS, C. D., and Heid, J. L.

TANGERINE JUICE PRODUCTS. Fruit Prod. Jour. and Amér. Food Mfr. 23, 132-134; 152, 153, 157 (1944).

A process is described for preparing bland syrup from tangerine juice by boiling with calcium carbonate, filtering, acidifying with citric acid to pH 5.2, decolorizing with carbon, and concentrating under vacuum. Approximately 50 to 80% of the ascorbic acid is retained in the syrup. Cost of production is discussed and comparison with prevailing prices of apple and maple syrups show that tangerine syrup might compete at a price between \$1.50 and \$3.50 per gallon. By omitting filtration, a cloudy concentrate suitable for beverage bases can be prepared.

3. PULLEY, G. N., Moore, E. L. and Atkins, C. D.

GRAPEFRUIT CANNERY WASTE YIELDS CRUDE CITRUS PECTIN. Food Indus. 16, 94-96, 136, 137 (1944).

Methods for preparing dried citrus pomace from grapefruit peel are discussed. Enzymes may be inactivated and most of the soluble material removed by boiling the ground peel in water for 5 to 7 minutes. This treatment is followed by washing the peel with several changes of cool water. The extracted peel is then pressed to remove excess water and dried to a moisture content of 4 to 8 percent. Addition of aluminum sulphate to the final leach assists in pressing prior to drying. The crude pomace may be extracted with hot acid solutions to yield pectin, varying in grade from 36 to 70 with the different acids employed. The highest grade was obtained with phosphoric acid of pH 1.5.

4. INGOLS, R. S.

THE CITRUS CANNING WASTE DISPOSAL PROBLEM IN FLORIDA. Presented at annual meetings of Florida Sewage Works Ass'n and Federation of Sewage Works Ass'n (1944).

This paper considers the question of what to do with the liquid citrus canning wastes in Florida. The liquid wastes from the canning

plants are dilute and present primarily a sanitary disposal problem. Descriptions are given of the methods used and others that could be used. The liquid waste from the cattle-feed plants is a press liquor containing approximately 10 per cent solids. The various methods for disposing of this liquor and for manufacturing several proposed by-products from it are reviewed. Results of the pilot plant study of the citrus canning plant wastes showed that it should be possible to treat the concentrated wastes from juicing plants.

5. VELDHUIS, M. K.

INVESTIGATIONS ON CITRUS FRUIT PRODUCTS. Proc. meeting, Florida State Horticultural Soc., 57:51-55 (1944).

The research program of the U. S. Citrus Products Laboratory, at Winter Haven, Florida, is described in a general way and a brief discussion is presented of each of the problems currently being investigated.

6. INGOLS, R. S.

UTILIZATION AND DISPOSAL OF CITRUS PROCESSING RESIDUES. Proc. meeting Florida State Horticultural Soc., 57:28-31 (1944).

The use of citrus pulp for making cattle feed has solved the solid wastes problem of the canning plants, but the manufacture of the cattle feed requires the disposal of a liquid waste that is a byproduct challenge. Some plants are now making citrus molasses as a byproduct, and an alcohol plant is now in production. Feed yeast is another promising byproduct. A simple biological method for decreasing the organic matter in low-volume, high-concentration wastes from juicing plants is recommended.

7. MOORE, E. L., Wiederhold, E., and Atkins, D. C.

CHANGES OCCURRING IN ORANGE AND GRAPEFRUIT JUICES DURING COMMERCIAL PROCESSING AND SUBSEQUENT STORAGE OF THE GLASS- AND TIN-PACKED PRODUCTS. Fruit Prod. Jour. and Amer. Food Mfr. 23, 270-5, 285 (1944).

Particular attention was given the retention of ascorbic acid in orange and grapefruit juices which averaged 98-99 percent during processing. During subsequent storage at 40° F. and about 80° F. there was a greater loss of ascorbic acid in bottled than in corresponding canned juices. Retention of ascorbic acid in both bottles and cans ranged from about 75 to 97 percent even after six months' storage. Flavor retention was better in the canned than in the bottled juices; bottled grapefruit juice was unpalatable after six months' storage at room temperature. Plain tin is preferable for packing grapefruit juice; it was also preferable for orange juice except that at room temperature the bottled orange juice had slightly better flavor retention.

8. ATKINS, C. D., Wiederhold, E., and Heid, J. L.

THE RECOVERY OF FLAVORING OIL FROM PERSIAN LIMES - PRELIMINARY EXPERIMENTS. Fruit Prod. Jour. and Amer. Food Mfr. 23, 306-8 (1944).

Preliminary tests were made on the quantity of oil present in and obtainable from cull Persian limes, including a comparison of extraction equipment and treatments in recovering the cold-pressed lime oil. By use of a tapered-screw press around one-third of the oil present in the whole fruit was recovered as cold-pressed lime oil and separated in a Laboratory Model Sharples Super Centrifuge. The properties of cold-pressed oil extracted during the tests were determined.

9. FLORIDA CITRUS COMMISSION and U. S. Citrus Products Station.

A SECOND YEAR OF CITRUS RESEARCH ON BYPRODUCTS AND PROBLEMS OF THE CITRUS CANNING AND CONCENTRATING INDUSTRY IN FLORIDA. Fruit Prod. Jour. 24, 71-73. (1944). South. Canner and Packer 5, 10-11, 20-22 (1944). Citrus Mag. 7, 8-10 (1944). Citrus Indus. 25, 6-8 (1944).

A general description is given with illustrations of the facilities and operation of the U. S. Citrus Products Station, Winter Haven, Fla. Brief summaries are included of projects under investigation from June, 1943, to June, 1944, which dealt with concentrates and powdered juices, glass- and tin-packed products, vitamin retention and canned juices, work on utilization of tangerines, and limes, and byproducts utilization.

10. ATKINS, C. D. and Moore, E. L. (with Florida Citrus Commission).

*TANGERINE JUICE CONCENTRATES - A Method of Utilizing Cull Tangerines in Preparing a Tangerine Sirup and Beverage Bases. Citrus Indus. 25, 3 (1944).

This is a brief account of the development of bland sirup and cloudy beverage base concentrates from tangerine juice described in the article, "Tangerine Juice Products," Fruit Prod. Jour. and Amer. Food Mfr., 23, 132-134; 152, 153, 157 (1944).

PICKLING AND BRINING

11. ETCHELLS, J. L. and Jones, I. D.

THE IMPORTANCE OF CARE IN THE PASTEURIZATION OF PICKLE PRODUCTS. Canner 98, 28 and 64 (1944).

Increasing importance of pasteurized pickled products is discussed. Precautions to be observed in pasteurizing such products are given with recommendations for control of the process and desirable plant practices in carrying it out. Emphasis is placed upon obtaining proper test samples and keeping accurate operating records to maintain quality and avoid losses.

12. JONES, Ivan D. (North Carolina Agricultural Experiment Station) and Etchells, J. L.

NUTRITIVE VALUE OF BRINED AND FERMENTED VEGETABLES. Amer. Jour. Pub. Health, 34, 711-18 (1944).

Lima beans, peas, snap beans, carrots, cauliflower and leafy vegetables were preserved by brining at various salt concentrations with or without addition of vinegar, and in some cases of lactic acid. Results are given on the retention of nutritional factors; calcium, carotene, vitamin B₁, and ascorbic acid. Losses of these factors, as well as protein and minerals in the desalinated products, were also determined. Desalting reduces sugars, ascorbic acid, and probably vitamin B₁ to a low level. Blanching is not recommended where carotene retention is important. Addition of acid increases retention of ascorbic acid during storage of the brined material.

13. ETCHELLS, J. L., and Jones, I. D.

PROCEDURE FOR PASTEURIZING PICKLE PRODUCTS. Glass Packer 23, 519-523, 546 (1944).

Pasteurization is required for all pickled products that do not contain sufficient vinegar and sugar to prevent fermentation by certain organisms. This paper discusses in detail selection of types of pickles, preparation by brining, and procedures for pasteurizing products requiring this treatment. Both batch and continuous pasteurizing is discussed. Specific recommendations are given for obtaining representative test samples and controlling the process to maintain high quality and yields.

SUGAR BEET

14. FORT, C. A., Byall, S. (I.) Hall, H. H., and Teunisson, Dorothea J. (II.)

*REPORT OF STUDIES ON UNIFORMITY OF QUALITY OF SUGARS. I. Chemical and Physical Studies on Beet Sugars of the 1943 Campaign. II. Biological Studies of the Sugars. (1944). AIC-62.

Annual report of quality factors and quality ratings of composite beet sugar samples from sixty factories operating during the 1943 campaign. Data on five additional beet sugars are also included, and as in previous reports, results of bacteriological examination of all of the samples are included. Data on ash content and ash conductivity factors of sugars, massecuites, and molasses are given special consideration and it is proposed that ratio of ash in sugar to that in massecuite be used to evaluate sugar end operation as it affects sugar quality.

SUGARCANE

15. BALCH, R. T. and Broeg, C. B.

SUGARCANE WAX STUDIES, 1942-1943. Sugar Bul. 22, 106-109, 117-119, 123-125, 127 (1944).

This paper presents a complete review and report of progress of work on sugarcane wax during 1942-1943. Wax contents of different varieties of cane are given, and its distribution in various factory products. Clarification mud press cake is the most practical source of wax. Burning cane trash reduced the wax content of press cake from about 14 to 10 percent. Detailed results are included on pilot plant experiments on extraction and refining of the wax with various solvents. Properties of the hard wax obtainable in Louisiana are given and commercial possibilities are considered.

TUNG

16. MC KINNEY, R. S., Rose, G. W., and Kennedy, Angus B.

CONTINUOUS PROCESS FOR SOLVENT EXTRACTION OF TUNG OIL.
Ind. Eng. Chem., 36, 138-144 (1944).

Tung kernels, commercial press cake, and experimentally prepared press cake containing 20% oil were extracted with n-hexane in a continuous countercurrent extractor. Preparation of the material for these extraction tests on a pilot plant scale and data on efficiency of extraction are given. Extraction must be carried out promptly after preparation of the material to obtain oils of low acidity. Some of the samples of oil tending to solidify will require heat treatment to make them permanently liquid. Results of tests on varnishes formulated with solvent extracted oil showed that they were equal to standard spar varnish.

17. MC KINNEY, R. S.

*MISCELLANEOUS STUDIES AT THE GAINESVILLE TUNG OIL LABORATORY.
Proc. Amer. Tung Oil Ass'n, 59-63 (1944).

This paper is a general report to the Tung Oil Association on the work of the Gainesville Laboratory dealing with preparation of plastics from tung meal, attempts to utilize the meal for feed, and experiments on clarification of tung oil by sodium bisulfite.

18. MC KINNEY, R. S., and Oglesbee, R. E.

*HULLING AND EXPRESSION OF OIL FROM TUNG FRUIT. Proc. Amer. Tung Oil Ass'n, 87-97 (1944).

A modified walnut huller was found to be effective in dehulling tung. The dehulled fruit required prompt drying to prevent deterioration. If properly dried, dehulled fruit can be stored and subsequently efficiently processed in mechanical oil presses.

19. BAHRT, G. M., Jones, R., Angelo, E. (Bureau of Plant Indus., Soils, and Agric. Eng.) Freeman, A. F., Pack, F. C., and McKinney, R. S.

*THE EFFECTS OF ZINC AND OTHER TRACE ELEMENTS ON OIL CONTENT OF TUNG FRUITS. Proc. Amer. Tung Oil Ass'n, 98-101 (1944).

Cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering in determining oil content of samples of tung fruit from a study of the effect of zinc and other trace elements.

20. FREEMAN, A. F., Pack, F. C., and McKinney, R. S.

EFFECT OF MOISTURE ON GRINDING OF TUNG KERNELS AND SOLVENT EXTRACTION OF MEAL. Oil and Soap 21, 328-330 (1944).

Data are presented to show the effects of moisture on grinding of tung kernels and on solvent extraction of oil from the resulting meal. They indicate that: (1) The efficiency of oil extraction can be materially increased by vacuum drying ground kernels before extraction. (2) The state of comminution obtainable on grinding tung kernels is dependent upon moisture content; above nine percent moisture content the efficiency of grinding, and consequently efficiency of extraction, decreases progressively with increase of moisture content; the most efficient grinding is obtained with material of moisture content in the range of six to nine percent; and, in general, progressively poorer grinding is obtained on tung kernels with moisture contents ranging downward from six percent.

21. MC KINNEY, R. S., Halbrook, N. J., and Oglesbee, R. E.

STUDIES IN THE EXPRESSION OF OIL FROM TUNG FRUIT. Oil and Soap 21, 353-357 (1944).

Tests were made on variously prepared tung meal using a laboratory scale continuous mechanical oil press. Best results were obtained with meal containing 4.2 percent moisture and 20 percent shell. When moist fruit is dehulled in the groves, it must be promptly and properly dried for efficient oil pressing. Pressing was not satisfactory on meals containing filter cake, on old kernels containing shell, or on meal dried at an air temperature of 320° F.

MISCELLANEOUS AND GENERAL

22. SCOTT, W. C. and Pentzer, D. J.

*PRESERVATION OF PINEAPPLE WITH SULFUR DIOXIDE. Fruit Prod. Jour. and Amer. Food Mfg. 23, 206, 213-217 (1944).

Sulfur dioxide was found superior to sodium benzoate for preserving pineapple, color and flavor being held for three months at room temperature. Addition of sugar to crushed fruit did not affect the results and large pieces were also preserved effectively. Twenty minutes boiling was sufficient to remove sulfur dioxide. Blanching of the material before preserving is not recommended.

23. CURL, A. L.

A COMPARISON OF SOME METHODS FOR THE DETERMINATION OF MOISTURE IN DEHYDRATED VEGETABLES. Canner. 98, 22-23 (1944).

Determination of moisture in leafy vegetables by distillation with benzene or toluene was compared with results obtained by drying six hours at 28-29 vacuum at 70° C. The methods agreed well on all vegetables except white potatoes containing 5-9% moisture. Results on white potatoes were about 1% lower by benzene distillation and 0.4% lower by toluene. Toluene distillation gave high results on all other vegetables. The benzene distillation method is acceptable for all vegetables except white potatoes for which toluene distillation is preferred.

24. HEID, J. L., and Curl, A. L.

PAPAYA PRODUCTS. Fruit Prod. Jour. and Amer. Food Mfr. 24, 41-44, 53 (1944).

Selected varieties of papayas, because of their delicious flavor, smooth texture, and high content of provitamin A and vitamin C, are excellent as fresh food and are also suitable for processing. Acceptable products have been prepared by dehydration, canning, pickling and preserving. Dehydrated papaya is believed to be suitable for incorporation in confec-tions and in concentrated food rations.

25. Agricultural Experiment Station of the North Carolina State College of Agriculture and Engineering and the Bureau of Agricultural and Industrial Chemistry.

SWEET POTATO VINE SILAGE. Special Circular No. 3 (1944).

Concise directions are given for harvesting and ensiling sweet potato vines, and the value of the silage and recommended rationing for dairy cattle are briefly discussed.

26. CURL, A. L., and Nelson, E. K.

A WATER-SOLUBLE MANNAN FROM THE SEEDS OF DAUBENTONIA DRUMMONDII. Jour. Am. Chem. Soc., 66, 1227 (1944).

Note on the isolation of a water-soluble mannan in 16% yield from which 43% of mannose can be obtained on hydrolysis. Seeds of Daubentonia drummondii might be an important source of mannose.

PATENTS

- * Process for the Production of Aconitic Acid. Emil K. Ventre, Herbert C. Henry, and Fred L. Gayle. U. S. Patent 2,345,079 (March 28, 1944).
- * Process for the Extraction of Aconitic Acid from Plant Juices. Emil K. Ventre, Joseph A. Ambler, Sam Byall, and Herbert C. Henry. U. S. Patent 2,359,537 (October 3, 1944).

NOTE: -- Patents may be purchased for ~~10¢~~^{25¢} each at the U. S. Patent Office, Department of Commerce, Washington 25, D. C. Stamps are not accepted and coins are sent at the sender's risk.

